Final Remedial Actions Quarterly Report Report Period: April 1997 - June 1997

McCormick & Baxter Creosoting Company Portland Plant

Task Order No. 88-97-5

September 1997

Prepared for:

STATE OF OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
811 Southwest Sixth Avenue
Portland, Oregon, 97204

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1 Introduction and Summary

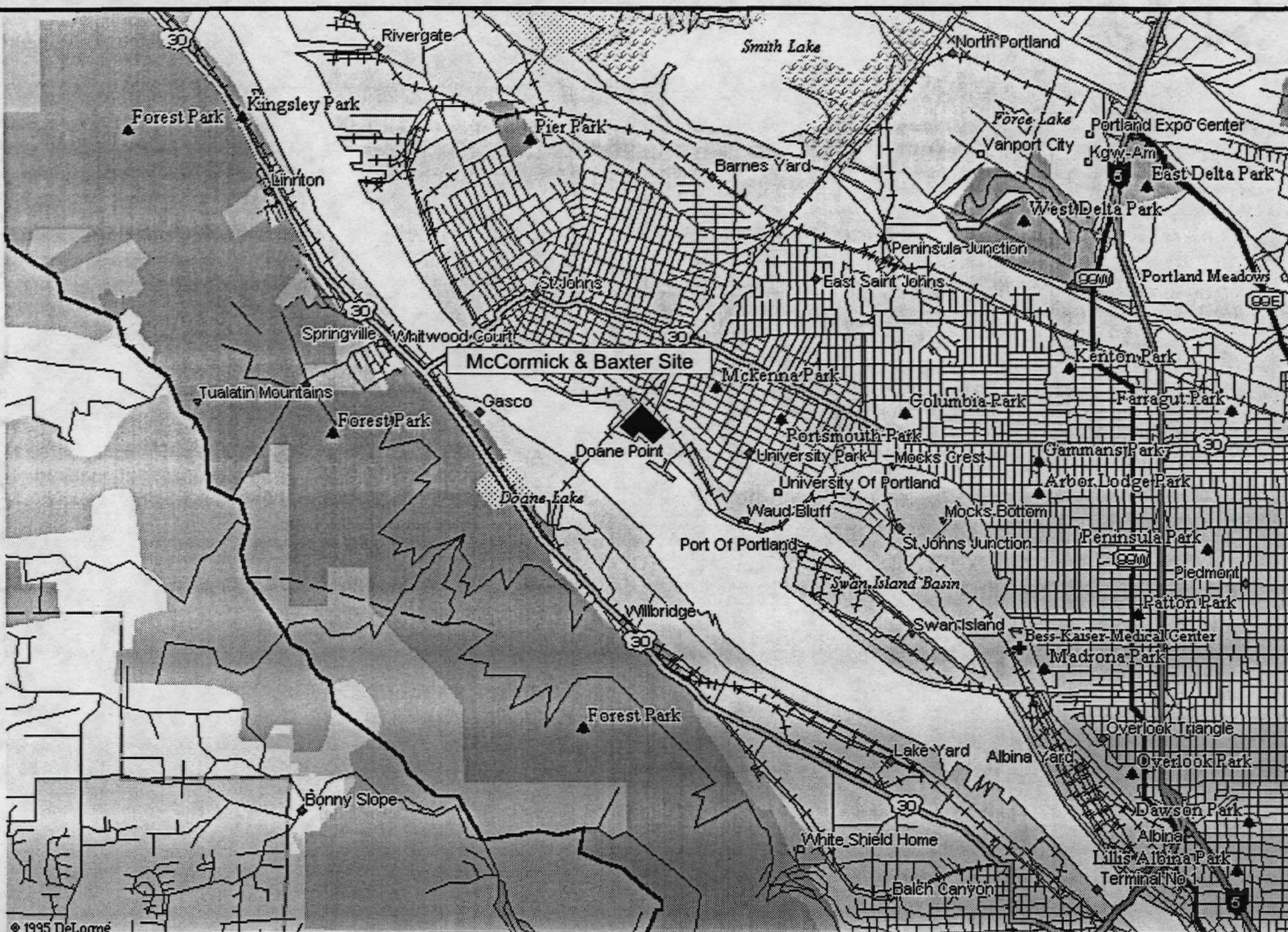
1.1 Introduction

Ecology and Environment, Inc. (E & E), under contract with the Oregon Department of Environmental Quality (DEQ), has prepared this Remedial Actions Quarterly Report for the McCormick & Baxter Creosoting Company, Portland Plant site (McCormick & Baxter) located in Portland, Oregon (see Figure 1-1). This report covers the period from April 1, 1997 to June 30, 1997. The site, a former wood treating facility, is located along the Willamette River at 6900 North Edgewater Street (see Figure 1-2). This document has been prepared under Task Order Number 64-93-23. The purpose of the task order is to assist DEQ with implementation of remedial actions, wastewater treatment plant operations and maintenance (O & M), and remedial design/remedial action activities at the site.

This Remedial Actions Quarterly Report describes the non-aqueous phase liquid (NAPL) extraction activities (Section 2), wastewater treatment plant/enhanced NAPL extraction operations (Section 3), quarterly groundwater monitoring (Section 4), general site operation tasks (Section 5) performed between April 1, 1997 and June 30, 1997, and recommendations and conclusions (Section 6). Appendix A contains documentation of transducer data generated during this period.

1.2 Quarterly Summary

Table 1-1 provides a monthly summary of activities conducted by E & E.



ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

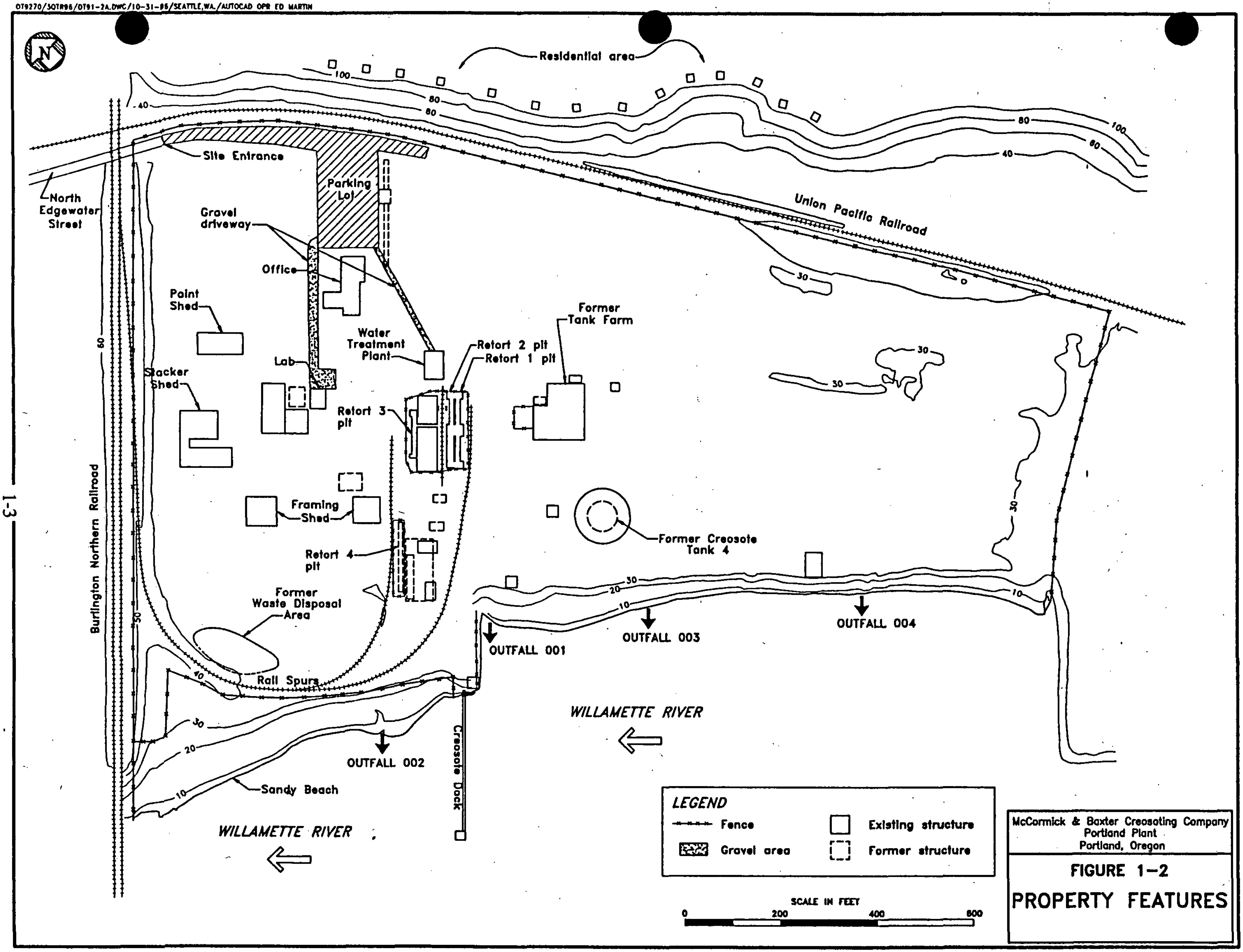
McCORMICK & BAXTER CREOSOTING CO.
PORTLAND, OREGON

FIGURE 1-1

SITE LOCATION MAP

Drawn By:	Date	TDD/Job No.	Dwg. No.
MRE	10-11-96	OT9020	OT9020F4

OT9270/3QTR96/OT91-2A.DWG/10-31-96/SEATTLE,WA./AUTOCAD OPR ED MARTIN



McCormick & Baxter Creosoting Company
Portland Plant
Portland, Oregon

FIGURE 1-2
PROPERTY FEATURES

TABLE 1-1

SUMMARY OF QUARTERLY ACTIVITIES
APRIL 1997 - JUNE 1997
McCORMICK AND BAXTER SITE
PORTLAND, OREGON

MONTH	ACTIVITY	STATUS
April 1997	Pure-phase NAPL extraction conducted on 9 wells over 4 days.	Complete
	NAPL measurements recorded on 4/11.	Complete
	Quarterly groundwater sampling performed week of April 21.	Complete
	Site truck tuned up (spark plugs, wires, air filter, and fuel filter).	Complete
	Phase I demolition conducted by E & E's subcontractor, Allied Demolition, continues.	Complete
	New compressor installed as part of the treatment system in the TFA.	Complete
	Health and safety fencing installed to better delineate the clean and exclusion zones.	Complete
	Drums containing previous investigation derived soil cuttings emptied onto existing soil stockpiles, steam cleaned, crushed, then disposed of as non-hazardous solid waste.	Complete
	Modified site trailer for quarterly groundwater sampling.	Complete
May 1997	Pure-phase NAPL extraction conducted on 7 wells over 3 days.	Complete
	NAPL measurements recorded on 5/18 and 5/30.	Complete
	Groundwater elevations measured on 5/15, 5/18, and 5/30.	Complete
	Phase I demolition completed by Allied Demolition on 5/29.	Complete
	Installed air lines to the pumps in the FWDA.	Complete
	Pilot treatment system installed in the FWDA by H2OIL.	Complete
	Pumps, controllers, piping, and ancillary equipment installed in four wells for the FWDA pilot treatment system.	Complete
June 1997	Pure-phase NAPL extraction conducted on 8 wells over 4 days.	Complete
	NAPL measurements recorded on 6/12 and 6/16.	Complete
	Initiate pumping test with the pilot treatment system in the FWDA.	Complete
	Groundwater elevations measured on 6/5, 6/12, 6/20, and 6/26.	Complete
	FWDA air compressor operations problems investigated and corrected.	Complete
	Electrical repairs started and completed by E & E's subcontractor, Oregon Electric Group.	Complete

2 NAPL Extraction Site Operations

NAPL Distribution

Releases of NAPL contaminants from the main source areas at the site, in particular the Tank Farm Area (TFA) and the Former Waste Disposal Area (FWDA), primarily have affected the shallow aquifer. Creosote and other organic compounds are found as both light nonaqueous-phase liquids (LNAPLs) and dense nonaqueous-phase liquids (DNAPLs) in soil and groundwater adjacent to the Willamette River. A pure-phase NAPL extraction system and total fluids system installed at the site by PTI have been operational since February 1993. As the pure-phase NAPL has migrated toward the river, it has also spread downward vertically, affecting a thick section of sands adjacent to the river. Two distinct NAPL plumes are present at the site: one in the TFA, the other in the FWDA. Smaller NAPL plumes are present near monitoring well MW-1 and the former location of Butt Tank #1 in the northeast portion of the site.

2.1 NAPL Measurements

The thickness of NAPL is measured in wells in the TFA and FWDA on a bi-weekly basis and prior to NAPL removal activities. The thickness of LNAPL and DNAPL varies on a daily basis due to a number of conditions including groundwater elevation, river stage changes, and pumping frequency. Tables 2-1 and 2-2 present the historical thicknesses of LNAPL and DNAPL (respectively) in the source areas and the average thicknesses measured in the monitoring wells for the quarter. NAPL measurements were recorded in April, May, and June 1997. Five monitoring wells (EW-12s, EW-17s, MW-10s, EW-15s, and MW-21s) contained NAPL measurements that exceeded the historic maximum measurements during this quarter. The extent of NAPL as determined by measurements during the quarter is presented in Figure 2-1.

During this quarter, the classifications of four wells in the TFA (EW-12s, EW-17s, EW-5s, and EW-4s) were changed from containing DNAPL only to containing both DNAPL and LNAPL. The classification of well MW-10s was changed from containing LNAPL only to containing both LNAPL and DNAPL. The classification of one well in the FWDA was changed during this quarter: well EW-15s, which historically contained only LNAPL, also contained DNAPL during this quarter.

Table 2-1

HISTORICAL AND MONTHLY LNAPL THICKNESS
APRIL 1, 1997 TO JUNE 30, 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

Well ID	Maximum LNAPL Thickness (ft)	Date	April 1997 LNAPL Thickness (ft)	May 1997 LNAPL Thickness (ft)	June 1997 LNAPL Thickness (ft)
Tank Farm Area					
EW-1s	1.3	?	NM	0.02	ND
EW-4s	1.5	Sep-92	NM	ND	0.01
EW-5s	0.9	Sep-94	NM	0.01	ND
EW-7s	1.4	Sep-92	NM	0.29	0.02
EW-12s	0.02	Jun-97	NM	ND	0.02
EW-17s	0.49	May-97	NM	0.49	0.36
EW-18s	4.43	Jul-94	NM	0.01	0.49
MW-Is	1.7	?	NM	ND	0.01
MW-Rs	3.1	Mar-96	1.04	1.91	1.34
MW-7s	2.76	Sep-92	NM	NA	ND
MW-10s	8.08	Feb-93	NM	ND	0.59
Former Waste Disposal Area					
EW-3s	0.87	Aug-96	NM	ND	ND
EW-6s	3.5	Aug-94	NM	0.84	1.94
EW-10s	7.5	Jul-93	NM	2.5	2.33
EW-14s	1.31	Mar-95	NM	0.01	ND
EW-15s	8.25	Sep-94	1.03	0.48	0.58
EW-20s	1.11	May-96	NM	NA	NM
MW-18s	0.14	Sep-94	NM	ND	ND
MW-21s	10.28	Sep-92	NM	2.85	2.4
MW-Es	2.97	Sep-92	NM	0.02	0.01
MW-Gs	2.34	Sep-92	NM	ND	ND
Other					
MW-1s	?	?	NM	2.79	3.5

Only wells with any LNAPL detected are presented in this table.

Key:
? = Unknown recording date
NA = LNAPL present, but at insufficient quantity for accurate measurement.
ND = LNAPL measured, but not detected.
NM = Not measured.
= Maximum measurement.

Table 2-2

HISTORICAL AND MONTHLY DNAPL THICKNESS
APRIL 1, 1997 TO JUNE 30, 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

Well ID	Maximum DNAPL Thickness (ft)	Date	April 1997 DNAPL Thickness (ft)	May 1997 DNAPL Thickness (ft)	June 1997 DNAPL Thickness (ft)
Tank Farm Area					
EW-1s	4.7	Oct-94	NM	0.36	0.60
EW-4s	6.2	Mar-93	NM	ND	ND
EW-5s	2.92	Dec-95	NM	2.13	1.86
EW-7s	2.09	Dec-94	NM	1.82	ND
EW-8s	2.7	Jul-93	NM	2.13	0.81
EW-17s	1.27	Aug-96	NM	0.32	0.73
EW-18s	1.02	Dec-95	NM	ND	ND
MW-10s	0.32	May-97	NM	0.32	0.26
MW-Is	9.93	Aug-87	1.98	2.26	2.36
MW-7s	3.67	Nov-91	2.50	3.29	1.11
MW-8i	3.62	Mar-96	1.91	1.57	1.80
EW-12s	1.15	Jan-96	NM	0.40	0.46
MW-22i	3.02	Oct-94	NM	1.61	1.27
MW-Ni	NA	NA	NM	ND	ND
Former Waste Disposal Area					
EW-2s	1.9	Aug-91	NM	0.53	0.55
EW-6s	3.4	Aug-93	1.54	1.00	3.80
EW-9s	3.16	Jan-96	1.62	1.58	1.81
EW-15s	0.16	May-97	NM	0.16	ND
MW-20i	34.32	Dec-94	12.77	13.33	8.10
MW-21s	0.94	May-97	NM	0.94	ND
MW-Ds	6.01	Jan-94	1.98	1.62	1.12
MW-Es	4.2	Aug-87	NM	2.71	1.65
MW-Gs	14.85	Mar-91	NM	13.72	4.83
Southeast Disposal Trench Area					
EW-11s	NA	NA	NM	ND	ND
MW-18s	NA	NA	NM	ND	ND
MW-19s	2.01	Jul-91	NM	ND	1.52

Only wells with any DNAPL detected are presented in this table.

Key:
? = Unknown recording date
NA = DNAPL present, but at insufficient quantity for accurate measurement.
ND = DNAPL measured, but not detected.
NM = Not measured.
[ ] = Maximum measurement.

2.2 Pure-Phase NAPL Extraction Summary

2.2.1 Manual NAPL Extraction

Pure-phase NAPL extraction was conducted manually throughout this operation period. The extraction process requires extensive manual labor to measure the NAPL wells for the presence of pure-phase product; set up the extraction pump; operate the pump to ensure minimal water extraction; and clean the oil/water interface probe, pump, and product hoses and carry the product to the Sludge Tank. Pure-phase NAPL extraction is considered a weekly activity. Table 2-3 contains a summary of the NAPL manually extracted during this period. Determining total NAPL volume removed is still an estimation process, and exact NAPL volumes are not known. However, the volumes listed in Table 2-3 represent visual estimates and calculations of NAPL and/or highly contaminated groundwater.

2.2.2 FWDA Continuous NAPL Extraction

Continuous NAPL extraction was performed on four wells in the FWDA over a period of 3 days in June. Three pumps were installed above the DNAPL/water interface in MW-Ds, MW-Gs, and EW-9s to induce the movement of more DNAPL toward the wells. The fourth pump was installed in the bottom of MW-20i for the purpose of removing DNAPL only. This pump extracted 5 gallons of NAPL during continuous operation. The continuous pumping stopped when no NAPL was present in the well.

E & E utilized Imhoff settling cones to evaluate the percentage of NAPL in water from MW-Ds, MW-Gs, and EW-9s. The settling cones provided a relatively quick method for determining whether NAPL was present in the pump effluent. However, the measurement of NAPL in the cones contained significant errors, and E & E determined that this method is not sufficiently accurate for quantifying the amount of NAPL removed from a well. The error associated with quantification of NAPL in the cones is caused by incomplete phase separation, insufficient measurement gradations to quantify LNAPL, and insufficient setting time.

To demonstrate the measurement inaccuracy, E & E used the percent NAPL measurements from each well to calculate a theoretical total NAPL extraction quantity of 115 gallons (over the 3-day test period). However, no measurable quantity of NAPL was noted in the treatment system. There could be two causes of this result:

1) The NAPL passed through the treatment system uncollected; or

2) The NAPL measurement was not accurate.

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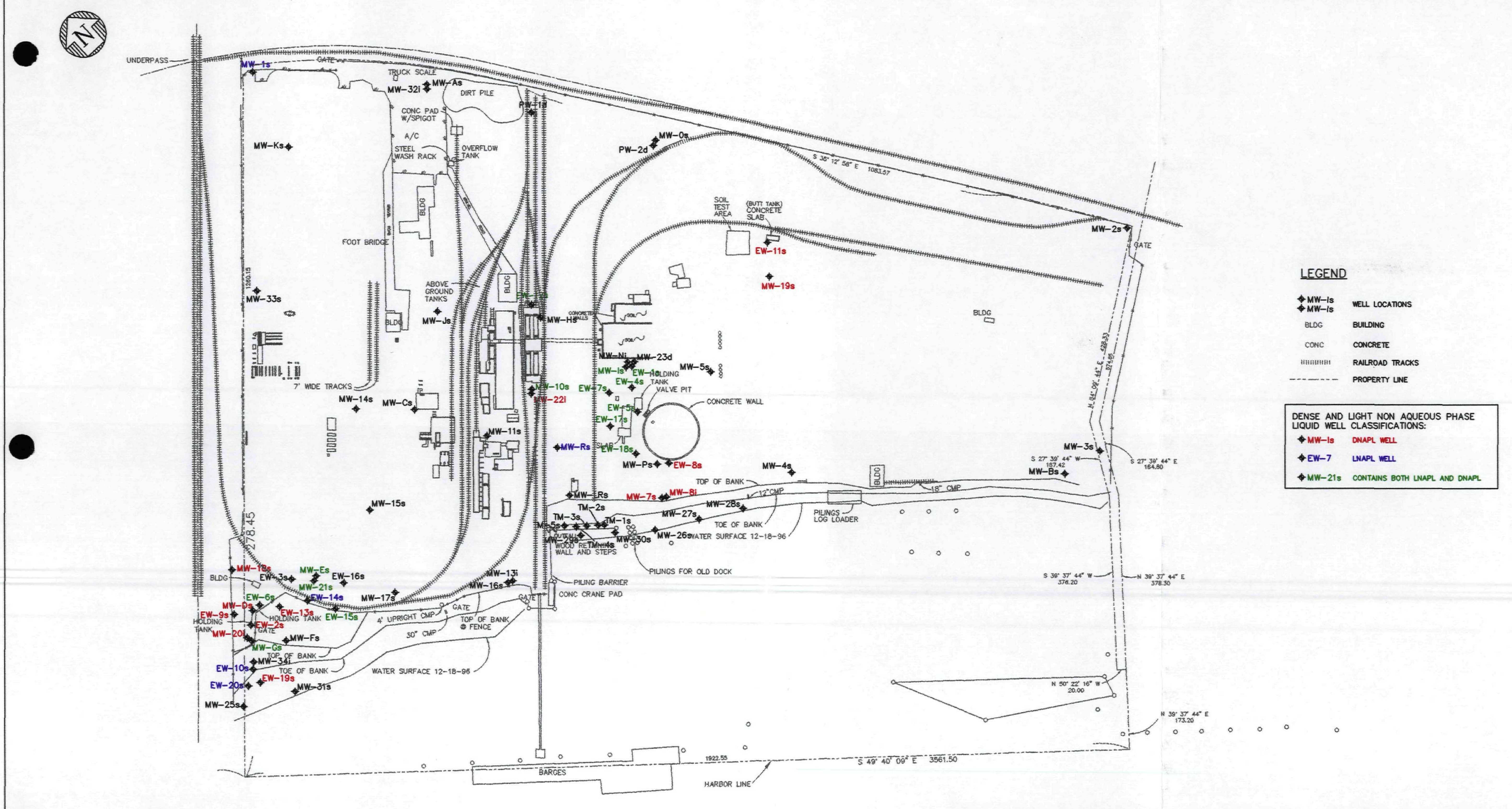

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DESIGNED BY: KEVIN SMITH
CHECKED BY: KEVIN SMITH
DRAWN BY: ED MARTIN
APPROVED BY: KEVIN SMITH

NO.	DATE	DWN	APP'D	DESCRIPTION
				REVISIONS

FIGURE 2-1
NAPL WELL CLASSIFICATIONS
APRIL 1997 TO JUNE 1997
McCORMICK & BAXTER CREOSOTING CO.
PORTLAND, OREGON

SCALE	DATE ISSUED	C.A.D. FILE NO.	DRAWING NO.
NOTED	08-07-97	OH422-1B.DWG	X OF X

Table 2-3

EXTRACTION WELL SUMMARY
APRIL 1, 1997 TO JUNE 30, 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON
(units: gallons)

Well	NAPL Extracted for Quarter
Tank Farm Area	
MW-7s	1.88
MW-8i	2.76
MW-1s	7.8
EW-1s	2.6
MW-Rs	1.48
Total:	**16.52**
Former Waste Disposal Area	
EW-15s	2.4
EW-6s	3.8
EW-9s	4.84
MW-20i	15
MW-Ds	3.72
Total:	**29.76**
Continuous NAPL Extraction	
MW-20i	5
Passive LNAPL Skimmers	
MW-1s, EW-14s	1
GRAND TOTAL:	**52.28**

Based on visual and analytical data, no NAPL was present in the system effluent; therefore, E & E has concluded that the Imhoff settling cone NAPL measurements are most likely inaccurate.

A longer duration for the continuous NAPL extraction was planned, but mechanical problems with the compressor used to operate the pumps and elevated zinc concentrations in the system effluent caused termination of the activities after 3 days. It is anticipated that the continuous NAPL extraction will resume during the next quarter.

2.2.3 Passive Skimmer LNAPL Removal

During this quarter, two passive LNAPL skimmers were purchased for the site and installed in wells MW-1s and EW-14s. The floating skimmers were installed across the water/LNAPL interface. The skimmers were emptied on a weekly basis, and approximately one gallon of LNAPL was removed from these wells during this quarter.

2.2.4 Site Summary

A total of approximately 52.28 gallons of NAPL was removed through various NAPL extraction techniques during in this quarter. In the TFA, MW-Is was the most productive NAPL well with a total estimated volume of 7.8 gallons removed by manual extraction. In the FWDA, MW-20i was the most productive NAPL well with 15 gallons of NAPL removed by manual NAPL extraction and 5 gallons removed during continuous extraction.

3 Water Treatment Plant and Enhanced NAPL Extraction

3.1 Water Treatment Plant Operation Summary

The following sections present a summary of treatment system operations from April 1, 1997 through June 30, 1997.

3.1.1 Pilot Treatment System Operation Summary

An estimated 220,837 gallons of water were extracted from the TFA extraction wells and conveyed to the water treatment system during this period. This volume is considered an estimate due to the limited accuracy of the flow measurements collected at each well.

The dissolved air flotation (DAF) unit operated for a total of 360 hours, and a total of 209,637 gallons of water were treated. The DAF unit generated approximately 10,935 gallons of sludge, which was stored in the Sludge Tank. The DAF unit consumed seven 55-gallon drums of RO-40 (heavy metal precipitator and coagulant), eight 5-gallon buckets of RO-2200 flocculent, and one 700-pound drum of caustic soda. Utilization of a concentrated form of RO-2200 was continued to allow the system operator to have better control over the quality of the polymer mixture.

The granular activated carbon (GAC) component of the treatment system was operated for 360 hours. A total of 208,256 gallons of water were filtered through the GAC. Two GAC vessels were consumed.

The discrepancy between the volume of water extracted from the TFA extraction wells (220,837 gallons) and the volume treated through the DAF and GAC units (209,637 gallons and 208,256 gallons, respectively) is a result of the storage of water in the treatment system tanks and, to a lesser extent, the limited accuracy of the water volume measurement techniques and meters. The difference between the volumes of water in the TFA wells and the DAF can be attributed to water remaining in the TFA Holding Tank and Tank 1. The difference between the volumes of water in the DAF and GAC can be attributed to water remaining in the DAF and Tank 2.

3.1.2 FWDA Treatment System Operation Summary

The FWDA treatment system was operated for 3 days in conjunction with the NAPL extraction/testing activities. The system operated from June 3, 1997 to June 6, 1997. During this period, the system operated without problems. The system experience an automatic shutdown during the weekend of June 7 and 8, 1997. Subsequent investigation by E & E and ADT's site technician determined that the air compressor motor stopped operating due to excessive heat. A technical representative from the air compressor supplier visited the site and inspected the air compressor installation. The technical representative commented that the weather/vandal proof housing (fabricated and installed by ADT) did not allow sufficient air flow across the compressor and motor. During operation, the motor overheated, which activated the motor's thermal overload protection device. This device automatically stopped the air compressor operation. E & E instructed ADT to modify the housing to allow more air flow while still providing weather and vandal protection. The repair consisted of removing three sides of the housing and replacing them with 1/4-inch steel grating. This repair was completed by June 27, 1997.

During operation, 1,892 gallons of water was treated and discharged from the system. No measurable increase of NAPL was detected in the settling tank or oil/water separator. LNAPL was visually present within the oil/water separator and the LNAPL was properly retained by the separator. The effluent from the separator's holding chamber was visibly clear in comparison to the dark brown water entering the separator. One effluent sample was collected from the system to evaluate the treatment's effectiveness and compliance with the site discharge limits. The analytical results for the sample (FWDA01) are presented in the following section.

3.1.3 Effluent Discharge Monitoring Results

The effluent analytical data collected during this quarter are presented in Table 3-1. Two effluent samples exceeded the daily allowable discharge concentrations for total copper and zinc and the monthly average concentration for copper and zinc. Sample DD29 contained a total copper concentration of 43 μg/L. The discharge limits for copper from the site are 20 μg/L (maximum monthly average concentration) and 30 μg/L (maximum daily concentration). Sample FWDA01 contained a total zinc concentration of 415 μg/L. In addition, the June 1997 monthly average concentration for zinc was exceeded. The discharge limits for zinc from the site are 190 μg/L (maximum monthly average concentration) and 280 μg/L (maximum daily concentration).

Table 3-1

SUMMARY OF EFFLUENT DISCHARGE RESULTS
APRIL 1, 1997 TO JUNE 30, 1997
MCCORMICK & BAXTER CREOSOTING COMPANY

PORTLAND, OREGON

Effluent Sample Date	Sample Number	Total Gallons	Discharge Dates	Discharge Rate (Gallons/day)	pH	Total PAHs (µg/L)	PCP (µg/L)	Total Arsenic (µg/L)	Total Chromium (µg/L)	Total Copper (µg/L)	Total Zinc (µg/L)
NPDES Monthly Average	**NA**	**NA**	**NA**	**NA**	**6.5 - 8.5**	**1700**	**22**	**80**	**350**	**20**	**190**
NPDES Daily Maximum	**NA**	**NA**	**NA**	**43,200**	**6.5 - 8.5**	**2500**	**33**	**120**	**500**	**30**	**280**
4/24/97	DD29	31728	4/4/97	1,586	6.9	ND	0.75 U	0.8 U	1.5	43	36
APRIL 1997 AVERAGE					**6.9**	**ND**	**0.75 U**	**0.8 U**	**1.5**	**43**	**36**
5/15/97	DD31*	17695	5/12/97	5,898	7	ND	0.7 U	0.5 U	0.58 U	16.8 U	38.3
5/23/97	DD32	27738	5/16/97	3,963	6.9	ND	0.75 U	3	1.1 U	18.2 U	83.7
5/30/97	DD33	19564	5/27/97	6,521	7	ND	5.2 U	1.1	3.7 U	16.8 U	57.7
MAY 1997 AVERAGE					**7.0**	**ND**	**<2.22**	**1.5**	**<1.793**	**<17.26**	**59.9**
6/6/97	FWDA01	1892	6/3/97	631	NM	ND	0.7 U	11.6	1.9 U	16.8 U	415
6/6/97	DD34	14375	6/3/97	4,792	6.9	2.63	0.88	1.4	1.9 U	16.8 U	172
6/12/97	DD35	17960	6/9/97	5,987	7.1	8.2	8.2	1.4	0.58 U	16.8 U	168
6/19/97	DD36	20004	6/16/97	6,668	7.1	ND	0.7 U	1.9	0.58 U	16.8 U	251
7/3/97	DD37	23631	6/23/97	2,363	7.1	1.91	0.64 J	8.7	0.58 U	16.8 U	19.6 U
JUNE 1997 AVERAGE					**7.1**	**4.2**	**2.2**	**3.4**	**<1.108**	**<16.8**	**205.1**

Key:

* - Sample DD30 was analyzed for total copper only prior to system start-up, no other compounds were analyzed for.

U - Compound was analyzed for but not detected, the corresponding value is the detection limit.

ND - None dectected

NA - Not applicable

NM - Not measured

[shaded] - Concentrations exceed discharge permit

NOTE: Monthly average concentrations that contain "U" data are calculated using the corresponding detection limit value.

Pilot Water Treatment System

Based on the elevated copper results, E & E recommended collection of one round of treatment train water samples for total and dissolved copper analysis. The purpose of this analysis was to attempt to locate the treatment stage that was concentrating the copper, resulting in elevated effluent concentrations. Following DEQ's approval, the water samples were collected on May 5, 1997. The pilot treatment system was then shut down until the results were available. The treatment train analytical results, provided in Table 3-2, indicate that copper is concentrated by the DAF into the DAF sludge. The sample analysis did not provide sufficient information to determine exactly how "slugs" of water containing elevated metal concentrations migrate from the DAF to the system effluent.

Through conversations with the site technician, E & E determined that Tank 1 has never been cleaned and a considerable quantity of sludge has accumulated in the bottom of the tank. The technician estimated the thickness at 6 to 8 feet. The sludge in Tank 1 consists of DNAPL from the TFA extraction wells and sludge from the DAF process. About once per week, the site technician decants water from the top of the Sludge Tank back into Tank 1. This water most likely contains certain quantities of sludge with elevated concentrations of copper (and other metals). In addition, decontamination water (generated during the removal of the 6,500-gallon polyethylene sludge tank) was placed into Tank 1 for on-site treatment in lieu of off-site disposal. The tank decontamination and removal work was completed prior to the current series of effluent problems. Based on the results of the copper treatment train samples, E & E instructed the site technician to restart the system since the effluent sample did not contain a detectable concentration of copper.

During May and through the first two weeks of June, the pilot water treatment system operated in compliance. However, during the third week of June, zinc was detected in sample DD36 at 251 μg/L. Although not in excess of the daily maximum concentration, it helped to elevate the monthly average concentration.

FWDA Treatment System

Sample FWDA01 corresponds to the first effluent sample collected from the new treatment system. Upon identifying the high zinc concentration, E & E immediately ceased operation of this system. A sample collected in the FWDA holding tank contained 464 μg/L of zinc, which indicated that the zinc is present in the groundwater. The FWDA system does not have a metal removal treatment component.

Table 3-2

SUMMARY OF TREATMENT TRAIN ANALYTICAL RESULTS
MAY 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

Units: ug/L (ppb)

Sample Number	Location	Total Copper	Dissolved Copper
SP1	Tank 1 Influent	9.3 U	9.3 U
SP12	Tank 1 Effluent	9.3 U	**18.8**
SP2	Mixing Tank 1	9.3 U	9.3 U
SP3	Mixing Tank 2	9.3 U	9.3 U
SP4	DAF Influent	9.3 U	**9.6**
SP5	DAF Effluent	9.3 U	9.3 U
SP6	Tank 2	9.3 U	9.3 U
SP7	DAF Sludge	**148**	**33.5**
SP8	Bag Filter Influent	9.3 U	9.3 U
SP9	Carbon 1 Infl	9.3 U	9.3 U
SP10	Carbon 2 Infl.	9.3 U	9.3 U
SP11	System Effluent	9.3 U	9.3 U

Key:
U - Compound was analyzed for, however, was not detected above the method detection limit.
The associated value is the method detection limit.
ppb - parts per billion

Table 3-2

SUMMARY OF TREATMENT TRAIN ANALYTICAL RESULTS
MAY 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

Units: ug/L (ppb)

Sample Number	Location	Total Copper	Dissolved Copper
SP1	Tank 1 Influent	9.3 U	9.3 U
SP12	Tank 1 Effluent	9.3 U	**18.8**
SP2	Mixing Tank 1	9.3 U	9.3 U
SP3	Mixing Tank 2	9.3 U	9.3 U
SP4	DAF Influent	9.3 U	**9.6**
SP5	DAF Effluent	9.3 U	9.3 U
SP6	Tank 2	9.3 U	9.3 U
SP7	DAF Sludge	**148**	**33.5**
SP8	Bag Filter Influent	9.3 U	9.3 U
SP9	Carbon 1 Infl	9.3 U	9.3 U
SP10	Carbon 2 Infl.	9.3 U	9.3 U
SP11	System Effluent	9.3 U	9.3 U

Key:
U - Compound was analyzed for, however, was not detected above the method detection limit. The associated value is the method detection limit.
ppb - parts per billion

3.1.4 Operation Modifications

No modification of the operation parameters were made this quarter.

3.1.5 Problems and Corrective Actions

Aside from the elevated effluent concentrations and the air compressor installation problems noted above, no other operation problems were identified during this quarter.

3.1.6 Off-Site Disposal

No off-site disposal was conducted during this quarter.

3.2 Enhanced NAPL Extraction

3.2.1 Operation Summary

Enhanced NAPL extraction was conducted throughout the operation period at wells EW-1, EW-4, and EW-7 in the TFA. The operation summary for each well is shown in Table 3-3.

3.2.2 Operation Modifications

No modifications to the enhanced NAPL extraction system operation were made during this quarter. The only change was improving the electrical power distribution in the TFA. This work did not change or impact the operation of the enhanced NAPL extraction system.

3.2.3 Problems and Corrective Actions

No problems were identified with the enhanced NAPL extraction activities during this quarter.

Table 3-3

TFA ENHANCED NAPL EXTRACTION WELL OPERATION SUMMARY
APRIL 1, 1997 TO JUNE 30, 1997
MCCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON
(units: as noted)

WELL NUMBER	TOTAL OPERATION TIME (HR:MN:SS)	WATER EXTRACTION RATE (gpm)	TOTAL VOLUME OF WATER EXTRACTED* (gallons)
EW-1	382:30:00	2.2	49,347
EW-4	382:30:00	3.7	85,339
EW-7	382:30:00	3.8	86,153
TOTAL			220,839

* = Volume estimated due to fluctuations in the flow rate.

4 Quarterly Groundwater Monitoring

Monitoring wells were sampled by E & E for the second quarterly groundwater sampling event during the week of April 21, 1997. The objective of quarterly groundwater sampling is to delineate areas where dissolved-phase organic and inorganic site contaminants are present in groundwater.

4.1 Groundwater Elevation Measurements

Groundwater elevations were measured in approximately 20 wells located throughout the site to determine the direction of groundwater flow. Daily groundwater fluctuations of several feet are common in the monitoring wells and are due primarily to river stage elevation changes, tidal influences, precipitation, and barometric pressure.

Horizontal Gradient

Horizontal groundwater gradients for the site were determined for average groundwater flows during the quarter.

The average shallow horizontal groundwater gradient determined from measurements made on June 12, 1997, indicated a gradient in the TFA of approximately 0.005 (27.25 feet/mile) toward the site and a gradient in the FWDA of approximately 0.014 (73.92 feet/mile) toward the site. The gradients were determined between wells EW-12s and MW-LRs in the TFA and MW-15s and MW-21s in the FWDA.

The average intermediate horizontal groundwater gradients were not determined in the TFA or the FWDA, as it is expected that gradients and directions are similar to the shallow aquifer zone. The intermediate aquifer zone is in direct contact with the shallow aquifer zone near the river.

No horizontal gradients were determined for the deeper aquifers at the site. MW-23d is completed in a different aquifer than the only other two deep monitoring wells, PW-1d and PW-2d.

Vertical Gradients

A comparison of paired monitoring wells MW-Is, MW-Ni, and MW-23d was performed to identify vertical groundwater gradients at the site, specifically the TFA. A vertical groundwater gradient of 0.98 downward was determined between the shallow and intermediate well for June 12, 1997. A gradient of 0.94 upward was determined in the intermediate and deep well on June 12, 1997.

4.2 River Elevation Measurements

The Willamette River pressure transducer was vandalized and not recovered. A new transducer was ordered and installed. Data will be recorded for the next quarter.

4.3 Quarterly Sampling Activities

Samples were collected from wells installed during the remedial investigation to evaluate the extent of groundwater contamination in the shallow, intermediate, and deep groundwater zones at the site (see Table 4-1) Groundwater samples were submitted to DEQ's laboratory in Portland, Oregon for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total metals, and total recoverable petroleum hydrocarbon (TRPH). Dissolved metals were eliminated from the sampling activities. Low flow sampling techniques have shown that the total and dissolved metals concentrations from samples collected at the site were within acceptable ranges of one another.

Groundwater samples were extracted from all wells using dedicated submersible pumps (Grundfos Redi-Flow 2 and 12-volt K-V), dedicated tubing, and low-flow sampling techniques. Samples for all analytical parameters were collected directly into sample containers from the pump. Purge water was containerized in DOT 17E/17H 55-gallon drums and treated in the on-site treatment system. After samples were placed in appropriate containers, they were preserved as required, placed on ice, and stored in coolers prior to delivery to the DEQ laboratory. A detailed description of sampling protocol is provided in E & E's Pre-Remedial Design Work Plan dated February 1996.

4.4 Groundwater Quality

Table 4-1 presents the organic and inorganic detections for the quarterly sampling event. A brief discussion of dissolved organic and inorganic contaminants in groundwater is presented below. In general, the wells selected for quarterly sampling were wells located along the site

Table 4-1

2nd QUARTER 1997
QUARTERLY SAMPLING ANALYTICAL RESULTS
MCCORMICK & BAXTER CREOSOTING COMPANY, PORTLAND, OREGON
SAMPLE COLLECTION DATE: April 1997
UNITS: mg/L
NOTE: Analytical results are presented for detections only.

Chemical Name (1)	EW-12s	MW-10s	EW-19s	MW-13i	MW-14s	MW-15s	MW-17s	MW-18s	MW-18s-Dup	MW-23d	MW-16
Arsenic		0.03	0.008	0.031	0.013	0.1	0.032	0.03	0.031	0.006	
Copper						0.05		0.02			
Chromium											0.04
Zinc			0.03		0.02	0.1		0.02		0.02	0.03
TRPH (estimate of %NAPL)	17	140	8			17		12	Void		
Pentachlorophenol	1.5	0.3	0.03					0.92	1.13	0.013	
Total PAHs	4.679	9.595	1.612					16.9421	11.449	0.005	

(1) Analytical results are reported for Alternate Concentration Limit compounds only.
These compounds are specified in the ROD.

Void = Sample flask broke during lab analysis procedures.
[shaded box] = Concentration exceeds the ROD action level for Zinc

ROD Action Levels

Total PAHs	43 mg/l
Pentachlorophenol	5 mg/l
Arsenic	1 mg/l
Chromium	1 mg/l
Copper	1 mg/l
Zinc	1 mg/l

Duplicates
MW-18s/MW-18s-Dup
MW-Fs/MW-Fs-Dup

Table 4-1

2nd QUARTER 1997
QUARTERLY SAMPLING ANALYTICAL RESULTS
MCCORMICK & BAXTER CREOSOTING COMPANY, PORTLAND, OREGON
SAMPLE COLLECTION DATE: April 1997
UNITS: mg/L
NOTE: Analytical results are presented for detections only.

Chemical Name (1)	MW-2s	MW-3s	MW-4s	MW-5s	MW-As	MW-Ks	MW-LRs	MW-Fs	MW-Fs-Dup	MW-Os
Arsenic			0.008	0.012	0.01	0.006	0.012	0.037	0.038	
Copper										
Chromium										
Zinc						1.4		0.33	0.43	2.1
TRPH (estimate of %NAPL)	5			5			16		5	7
Pentachlorophenol								0.33	0.016	
Total PAHs								2.509	8.893	0.0031

(1) Analytical results are reported for Alternate Concentration Limit compounds only.
These compounds are specified in the ROD.

= Concentration exceeds the ROD action level for Zinc

ROD Action Levels		Duplicates
Total PAHs	43 mg/l	MW-18s/MW-18s-Dup
Pentachlorophenol	5 mg/l	MW-Fs/MW-Fs-Dup
Arsenic	1 mg/l	
Chromium	1 mg/l	
Copper	1 mg/l	
Zinc	1 mg/l	

boundaries and the river and not directly within the free-product NAPL plumes in the TFA and FWDA. During past quarterly sampling events, several wells were identified that contained significant amounts of NAPL, which causes artificially higher dissolved groundwater concentrations in the samples. The concentrations of contaminants would obviously be expected to be higher in wells in which pure-phase NAPL is present, and previously collected analytical data show this to be the case at the site.

Arsenic

Total arsenic was detected in 14 of the 19 quarterly monitoring wells. The concentrations ranged from 0.006 mg/L to 0.039 mg/L. None of the arsenic detections exceeded the alternate concentration limit (ACL) for arsenic of 1 mg/L defined in the Record of Decision (ROD). The frequency and range of arsenic concentrations detected in this quarter are consistent with the data from the previous quarters.

Chromium

Total chromium was detected in one of the 19 quarterly monitoring wells: 0.04 mg/L in MW-16s. This detection did not exceed the ACL for chromium of 1 mg/L, as defined in the ROD.

Copper

Total copper was not detected in groundwater samples collected for this quarter.

Zinc

Total zinc was detected in 10 of the 19 quarterly monitoring wells. The concentrations ranged from 0.02 mg/L to 2.1 mg/L. The ACL for zinc defined in the ROD is 1 mg/L. Two detections exceeded the ACL, MW-Ks at 1.4 mg/L and MW-Os at 2.1 mg/L. These wells typically contain elevated concentrations of zinc.

Total Recoverable Petroleum Hydrocarbons

TRPH analysis is conducted as a method for determining the percent of NAPL in the water samples. Elevated concentrations of TRPH (i.e., the presence of NAPL in the water) could impact the analytical results of the dissolved organic contaminants. TRPH was detected in 10 of the 19 quarterly monitoring wells. The concentrations ranged from 5 mg/L to 140 mg/L. The 140 mg/l detection is from well MW-10s in which some LNAPL is present. There is no ACL for TRPH defined in the ROD. The frequency of TRPH concentrations detected this quarter are consistent with the data from the previous quarters. However, concentrations are generally an order of magnitude higher than what has been detected in previous quarterly groundwater analysis.

Pentachlorophenol

Pentachlorophenol (PCP) was detected in 6 of the 19 quarterly monitoring wells. The concentrations ranged from 0.013 mg/L to 1.5 mg/L. The ACL for PCP defined in the ROD is 5 mg/L. None of the PCP detections exceeded the ACL. Monitoring wells MW-LRs, EW-19s, and MW-29s are considered compliance points. No PCP was detected in MW-LRs;, EW-19s had a concentration of 0.03 mg/L, substantially lower than the ACL; and EW-29s was not sampled this quarter due to high river levels.

Total Petroleum Aromatic Hydrocarbons

Concentrations for total petroleum aromatic hydrocarbons (PAHs) were determined by summing concentrations for all detected PAH compounds. Total PAHs were detected in 7 of the 19 quarterly monitoring wells. The concentrations ranged from 0.005 mg/L to 16.9421 mg/L. The ACL for total PAHs defined in the ROD is 43 mg/L. No detections of total PAHs exceeded the ACL. Monitoring wells MW-LRs, EW-19s, and MW-29s, located near the river, are considered compliance points. No PAHs were detected in MW-LRs; EW-19s had a concentration of 1.612 mg/L, substantially lower than the ACL; and EW-29s was not sampled this quarter due to high river levels.

4.5 Site Database

All data previously generated by PTI during the RI/FS process and data currently generated by E & E during operation of the site have been incorporated into an electronic database using Microsoft Access™. The query structure for normal database operation is under development and has been expanded based on data needs for the operation of the site (e.g., determination of well screen elevations versus groundwater elevations versus LNAPL thickness). Information is imported into Access from electronic files when available, or entered manually if not available in a compatible electronic format.

All sample numbers and analytical data for the site have been incorporated into the database, including as-built information for all existing monitoring and extraction wells. Spatial (northing/easting coordinates) and elevation/depth information for each sample location have also been incorporated into the database.

Analytical data collected by E & E are incorporated into the database as the data are received from the laboratory, and data collected from the monitoring wells and daily site activities are entered into the database on a weekly basis. Currently, quarterly sampling data from DEQ is not provided to E & E in an electronic format; consequently, E & E is required to manually enter the data into the database.

The database is capable of providing tabulated and formatted data via querying procedures for contouring, statistical programs, or other software. The data can then be used in the calculation of volume estimates for potential removal alternatives or interim removal action measures, or any other use, as necessary.

The database is in a compatible format and can be provided to DEQ for use in their own database system. The database is available for inspection and is currently maintained in E & E's offices in Seattle and Portland.

5 General Site Operations

5.1 Health and Safety

No accidents or injuries occurred during this quarter.

Additional fencing was installed to restrict access to the contaminated areas of the site. The fencing was placed around the parking lot, along the sides of the access roads to the laboratory and shop buildings, and around the office building. Small gates were installed at certain locations for personnel and vehicle access. Boot wash stations were installed at each gate. Transition from the contaminated areas to clean areas requires passing through the boot wash areas.

During completion of Phase I demolition activities (discussed in Section 5.3), it became apparent that the lack of debris and buildings would facilitate the increasing of wind speeds across the site. The increased wind will generate dust composed of surface soil. This phenomenon was noted during the demolition activities; however, due to an unusually moist spring, the dust generated was not excessive. Based on these observations, E & E informed DEQ's project officer that excessive dust generation will occur during July, August, and September, when rain fall is typically lowest. E & E proposed implementation of a dust suppression system consisting of irrigation sprinklers supplied with water from the site fire hydrants. This approach appeared to be the most flexible and cost effective since dust control is only needed during summer months and only short-term water application rates are required. DEQ approved the dust suppression system, which will be installed by ADT at the end of July 1997.

5.2 Site Security

During this quarter, the pressure transducer located on the site dock was stolen, and vandals broke into the FWDA treatment system housing container. Following these incidents, the site security officer observed two individuals on the site dock and contacted the Portland Police Department. The Police arrested both people and charged them with trespassing. According to the police report, the arrested individuals were involved in the vandalism of the FWDA treatment system; however, it was not determined whether they were responsible for the theft of the pressure transducer.

No significant damage was done to the FWDA treatment system equipment by the trespassers. The site technician fabricated and installed a supplemental door lock to prevent the use of crow-bars or bolt cutters to gain access to the container.

The site dock pressure transducer was replaced at the end of June 1997.

5.3 Phase I Demolition Activities

Under contract with the Oregon DEQ, E & E performed demolition oversight activities at the McCormick and Baxter site in Portland, Oregon as part of ongoing remedial actions. The selected demolition contractor for this work was Allied Demolition and Dismantling Co. (Allied) of Wilsonville, Oregon. Phase I demolition work consisted of demolishing 18 on-site structures, sorting wood and metal debris, transporting appropriately decontaminated wood and metal off site for disposal, and stockpiling ACZA-contaminated wood on site. Decontaminated wood was transported to the Hillsboro landfill for disposal. Decontaminated metal was transported to Snitzer Steel Works for recycling. Randy Earlywine, Mike Witnauer and Kevin Smith of E & E performed the oversight duties for this project. The demolition work began on March 17, 1997 and ended on May 28, 1997. The project was completed on schedule and under budget.

During project activities, E & E oversight personnel visually inspected each load of material that was removed from the site to ensure that no ACZA-treated wood or heavily contaminated wood or metal was removed from the site. ACZA-contaminated wood was stockpiled on site in a central location. Metal that was heavily contaminated with wood treatment product and concrete blocks from the kiln dryer building also were stockpiled on site. These items will be removed during future remedial actions.

On April 3, 1997, DEQ personnel Bill Dana (project manager) and Steve Campbell (contracting officer) visited the site at E & E's request to validate that the work was proceeding as planned. Discussions focused on issues such as "how clean is clean" in regard to the removal of small wooden splinters. In addition, E & E presented disposal options for steel production equipment. Much of this equipment had been coated with large amounts of grease as lubrication. In addition, as a result of their location in open-air structures, the equipment had a large amount of dust on all surfaces. It was decided that all steel exhibiting grease would be steam cleaned prior to being transported off site. The subcontractor agreed to this. DEQ inspected several crushed drums remaining on site from a previous contractor's activities, and inspected the roadway's condition in preparation for future site work.

STE issued one change order (dated May 8, 1997) to the original scope of work for this job. The change order primarily dealt with adjusting original material quantity estimates but also increased the number of structures to be demolished. Original quantity estimates were low. This was due to the inherent difficulty of estimating quantities of these types of demolition debris, and the fact that undergrowth had made it difficult to see large quantities of material. Additional structures for demolition in some areas were added per DEQ's request.

In summary, the change order added three buildings to the original 18 buildings that were scheduled for demolition, 100 tons of scrap metal to the original 400 ton estimate, 425 tons of creosote/PCP wood to the original 500 ton estimate, 6 tons of tires to the original 2 ton estimate, and a new item for garbage disposal with a quantity estimate of 7 tons. Final demolition quantities and associated costs are presented in Table 5-1.

5.4 Emergency Electrical Repairs

With DEQ's approval, E & E procured an electrical contractor to repair the electrical system at the site to eliminate electrocution hazards and to bring the site into compliance with national and local electrical code requirements. E & E procured Sunset Electrical Co. of the Oregon Electric Group to utilize personnel trained for working at hazardous waste sites to conduct the repairs. The subcontract was based on time and materials with a not-to-exceed price of $30,000.

Repair work was defined by City of Portland electrical inspector Mike McCool during a site walk conducted on April 30, 1997. Oregon Electric started repair work on June 2, 1997 and completed the work on June 30, 1997. The major work items that were completed are listed below.

Laboratory Building

Laboratory Power Installation. Installed proper weather head and supporting mast to connect overhead power to the building.

Shop Building

Site Electric Meter. Installed ground wire and grounding rod for meter.

DAF Treatment Area. Installed rigid conduit from main power panel in the shop to a new local power panel on the shop wall at the DAF tank. Routed three-phase, 480V power from main panel to a new local power distribution panel by the DAF. Reused an existing 120/240V single-phase transformer mounted onto the new panel to supply lower voltage power to certain DAF components. Installed new 120/240V single-phase and 480V three-phase local power distribution to DAF motors and DAF control panel. Removed existing plugs on three-phase motors and hard wired them to the local power panel in protected conduits. Installed a row of switch-operated 120V outlets onto the local power panel board. Reinstalled existing extension cords from mixers, chemical feed pumps, and other small 120V motors to the switch-operated outlets. Connected

TABLE 5-1

FINAL PHASE I DEMOLITION TOTALS
McCORMICK & BAXTER CREOSOTING COMPANY
PORTLAND, OREGON

		Base Contract			
Bid Item	**Description**	**Unit Price**	**Quantity**	**Units**	**Item Total**
1	Mob/Demo	$17,793	100%	LS	$17,793
2	Structure Demolition	45,380	100%	LS	$45,380
3	Scrap Metal Dismantling	23,204	100%	LS	$23,204
4	Scrap Metal Recycling	53	500	tons	$26,455
5	Creosote Wood Disposal	98.39	969.71	tons	$95,410
6	ACZA Wood Stockpile	51	406	cy	$20,848
7*	Tire Disposal	235	0	tons	0
8	A-Frame Pulley Demo	11,266	100%	LS	$11,266
Change Order 1					
A	Garbage Disposal	325	6.96	Tons	$ 2,262
TOTAL					**$242,618**
Total Approved					**$250,074**
Cost Remaining					**$ 7,456**

* The demolition contractor (Allied Demolition) decided to reuse the tires from the site. Therefore, no costs were associated with this item.

loose cords to existing supports to prevent contact with the shop floor. Installed two single-gang outlets on local switches to mixers connected to the local power panel with rigid conduit to provide general utility power connections. Eliminated all extension power cords from the shop floor. Installed new overhead directional lights (400-watt metal halide) in corner of shop above the DAF. Installed light switch on local power panel.

Shop Main Power Panel Area. Removed 120V single-phase line that was routed across the ceiling and outside to the TFA. Reinstalled the existing 480V three-phase line from the main panel in rigid conduit to a proper weather head outside of the shop on the southeast corner. Installed the 480V three-phase line overhead from the new weather head to the TFA. (See TFA for further descriptions.)

Shop Storage Room. Installed fluorescent lighting fixtures in room with operation switch on the outside of the entry.

Air Compressor/Decontamination Pad Area. Installed straps onto existing, flexible cable powering existing air compressor. Replaced existing extension power cord to decontamination pad with rigid conduit from existing outlet box to a new weatherproof outlet mounted on the exterior of the shop building. Installed GFI-protected outlets.

Tank Farm Area

Power Pole Installation. Installed two new power poles to extend the overhead 480V three-phase power from the shop building to the TFA.

Local TFA Power Panel. Installed power drop from overhead line to a local power panel mounted to a code-approved panel secured to the power pole. Installed a new 25 kVA, three-phase transformer onto local power panel. All power installation for TFA was set to 120/240V single-phase. Three-phase power supply was kept for potential future use. Installed local breaker panel in weatherproof boxes. Installed two submersible pump control switches onto local disconnect at the well heads. Installed rigid conduit from the control switches to the monitoring wells equipped with submersible pumps. A local disconnect, to allow pump removal at both well heads, was installed. The local disconnects were mounted onto the outer well casings.

Flood Light Installation. Installed two 1,000-watt metal halide flood lights onto the power pole in the TFA to provide light for security and work activities.

Treatment System Tanks

Overfill Tank Sensors. Installed power for two 120V tank overfill sensors from the new local DAF power panel in the shop. Installed rigid conduit along the top of both water storage tanks. Installed a weatherproof, GFI-protected outlet box on the northwest exterior wall of the shop.

5.5 Portland Fire Department Site Walk

On May 20, 1997, approximately 20 firefighters and battalion chiefs from the Portland Fire Department attended a site walk to learn more about the site operations, hazardous compounds, and physical hazards. The purpose of the site walk was to provide them the information required for response to a fire or accident. E & E provided a site map for incorporation into the Portland Fire Department's computer system. Physical hazards such as the retort pits were of primary interest since the pits and the associated tunnel could cause drowning hazards. E & E also identified certain areas of high contamination for which personnel and vehicle entry is not recommended; these areas are fenced. The vehicle decontamination pad was also identified as well as the location of on-site fire hydrants.

6 Conclusions and Recommendations

6.1 NAPL Extraction Operations

Based on the continuous NAPL extraction activities conducted in the FWDA during this quarter, E & E has developed the following conclusions and recommendations.

The Imhoff settling cones will be an adequate tool to visually inspect the liquid removed from wells during NAPL extraction. Their primary use will be to determine whether NAPL is present in the well during pumping. If NAPL is not identified in the settling cone, operation of the pump will be stopped. However, the cone measurements do not provide sufficient accuracy to quantify the amount of NAPL extracted from a particular well. The best method to quantify NAPL collection is to monitor the NAPL collected in the FWDA holding tank, oil/water separator, and the LNAPL collection drum. By comparing the NAPL collected in these areas to the total amount of water discharged from the system, a reliable and meaningful ratio of NAPL to water is obtained.

E & E will continue to utilize the Imhoff cones and will document the approximate NAPL percentages on the field forms. However, E & E will not utilize the measurements to document the volume of NAPL generated. E & E will utilize the measurements in the FWDA treatment system to quantify the NAPL generation.

6.2 Groundwater Extraction and Treatment Operations

E & E concludes that two actions are required to correct the discharge problems with the treatment systems:

1) Both systems require a polish treatment step to protect against metals being discharged from the site in concentrations that exceed the ROD levels; and

2) All sludge from Tank 1 should be removed and the tank should be cleaned.

Since both treatment systems are relatively short term systems (approximately 2 more years of operation), E & E recommends purchase and installation of ion exchange treatment vessels containing resin specific to copper and zinc. These vessels would be installed in the system after the GAC units, which will reduce the concentrations of zinc and copper in the effluent. It is possible to clean the spent ion exchange resin with acid solution to regenerate the resin on site; however, the initial set-up requirements, regeneration effort, and storage of the acid would be time consuming and costly. In addition, the acid cleaning solution would require disposal as a listed hazardous waste. E & E proposes to remove the spent resin and dispose the resin as a hazardous waste. New, virgin resin would be placed into the original vessel. E & E will provide DEQ a technical memorandum documenting the proposed activity when costs are obtained from vendors.

E & E recommends removal of the sludge from Tank 1 as a work item for the subcontractor that will remove the hazardous waste debris generated during the Phase I Demolition activities. The sludge will have to be incinerated to comply with the hazardous waste land disposal restrictions.

6.3 Quarterly Groundwater Monitoring

The dedicated sampling pumps (installed in the previous quarter) operated smoothly during this quarter. The use of these pumps allowed the field sampling team to be reduced from four to two people.

6.4 General Site Operations

No recommendations are presented this quarter.

Appendix A
Transducer Data